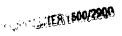
SEQUENCE LISTING



<110> GEORGES, FAWZY

DONG, JIN-ZHUO

KELLER, WILF

HUSSAIN, ATTA A. K.

SELVARAJ, GOPALAN

DATLA, RAJU



RECEIVED

11.7 15 2000

TECH CENTER 1600/2900

<130> pct

<140>

<141>

<150> US 60/072156

<151> 1998-01-22

<150> US 09/012453

<151> 1998-01-23

<160> 7

<170> PatentIn Ver. 2.0

<210> 1

<211> 483

<212> DNA

<213> Arthrobacter pascens

<400> 1

atggaccaat tcgtgggtct ccacatgatc tacacatacg agaacggttgg gagtacgaa 60 atctacatca agaacgacca cacaatcgac taccgtatcc acagtggtat ggtgggtggt 120 aggtgggtga gggaccaaga ggtgaacatc gtgaagctca caaagggtgt gtacaaggtg 180 agctggacag agccaacagg tacagacgtg agcctcaact tcatgccaga ggagaagagg 240 atgcacggtg tgatcttctt cccaaagtgg gtgcacgaga ggccagacat cacagtgtgc 300 taccaaaacg actacatcga cctcatgaag gagagcaggg agaagtacga gacataccca 360 aagtacgtgg tgccagagtt cgctgacatc acatacatcc accacgctgg agtgaacgac 420 gagacaatca tcgctgaggc tccatacgag ggtatgacag acgagatcag ggctggtagg 480 aag

<210> 2

<211> 161

<212> PRT

<213 > Bacillus pumilus

<400> 2

Met Asp Gln Phe Val Gly Leu His Met Ile Tyr Thr Tyr Glu Asn Gly

1 5 10 15

2/-

Trp Glu Tyr Glu Ile Tyr Ile Lys Asn Asp His Thr Ile Asp Tyr Arg
20 25 30

Ile His Ser Gly Met Val Gly Gly Arg Trp Val Arg Asp Gln Glu Val

35 40 45

Asn Ile Val Lys Leu Thr Lys Gly Val Tyr Lys Val Ser Trp Thr Glu
50 55 60

Pro Thr Gly Thr Asp Val Ser Leu Asn Phe Met Pro Glu Glu Lys Arg

70 75 80

Met His Gly Val Ile Phe Phe Pro Lys Trp Val His Glu Arg Pro Asp

85 90 95

Ile Thr Val Cys Tyr Gln Asn Asp Tyr Ile Asp Leu Met Lys Glu Ser

100 105 110

Arg Glu Lys Tyr Glu Thr Tyr Pro Lys Tyr Val Val Pro Glu Phe Ala
115 120 125

Asp Ile Thr Tyr Ile His His Ala Gly Val Asn Asp Glu Thr Ile Ile
130 135 140

Ala Glu Ala Pro Tyr Glu Gly Met Thr Asp Glu Ile Arg Ala Gly Arg

145 150 155 160

Lys

<210> 3

<211> 546

<212> PRT

<213> Arthrobacter pascens

<400> 3

Met His Ile Asp Asn Val Glu Asn Leu Asn Asp Arg Glu Phe Asp Tyr

1 5 10 15

Ile Ile Ile Gly Gly Ser Ala Gly Ala Ala Val Ala Ala Arg Leu
20 25 30

Ser Glu Glu Pro Thr Val Ser Val Ala Leu Val Glu Ala Gly Pro Asp 35 40 45

Asp Arg Gly Val Pro Glu Val Leu Gln Leu Asp Arg Trp Met Glu Leu 50 55 60

Leu Glu Ser Gly Tyr Asp Trp Asp Tyr Pro Ile Glu Pro Gln Glu Asn
65 70 75 80

Gly Asn Ser Phe Met Arg His Ala Arg Ala Lys Ile Met Gly Gly Cys
85 90 95

Ser Ser His Asn Ser Cys Ile Ala Phe Trp Ala Pro Arg Glu Asp Leu
100 105 110

Asp Glu Trp Glu Ser Lys Tyr Gly Ala Thr Gly Trp Asn Ala Glu Ser

Ala Trp Pro Leu Tyr Gln Arg Leu Glu Thr Asn Glu Asp Ala Gly Pro
130 135 140

Asp Ala Pro His His Gly Asp Ser Gly Pro Val His Leu Met Asn Val
145 150 155 160

Pro Pro Ala Asp Pro Ala Gly Val Ala Leu Leu Asp Ala Cys Glu Gln
165 170 175

Ala Gly Ile Pro Arg Ala Lys Phe Asn Thr Gly Thr Thr Val Ile Asn
180 185 190

Gly Ala Asn Phe Phe Gln Ile Thr Arg Arg Ala Asp Gly Thr Arg Ser

195 200 205

Ser Ser Ser Val Ser Tyr Ile His Pro Ile Ile Glu Arg Gly Asn Phe 210 215 220

Thr	Leu	Leu	Thr	Gly	Leu	Arg	Ala	Arg	Gln	Leu	Val	Phe	Asp	Ala	Asp
225					230					235					240
Lys	Arg	Cys	Thr	Gly	Val	Asp	Val	Val	Asp	Ser	Ala	Phe	Gly	Arg	Thr
				245					250					255	
His	Arg	Leu	Ser	Ala	Arg	Cys	Glu	Val	Ile	Leu	Ser	Thr	Gly	Ala	Ile
			260					265					270		
Asp	Ser	Pro	Lys	Leu	Leu	Met	Leu	Ser	Gly	Ile	Gly	Pro	Ala	Ala	His
		275					280					285			
Leu	Ala	Glu	His	Gly	Val	Glu	Val	Leu	Val	Asp	Ser	Pro	Gly	Val	Gly
	290					295					300				

Glu His Leu Gln Asp His Pro Glu Gly Val Val Gln Phe Glu Ala Lys
305 310 315 320

Gln Gln Met Val Gln Thr Ser Thr Gln Trp Trp Glu Ile Gly Ile Phe
325 330 335

Thr Pro Thr Glu Asn Gly Leu Asp Arg Pro Asp Leu Met Met His Tyr 340 345 350

Gly Ser Val Pro Phe Asp Met Asn Thr Leu Arg Tyr Gly Tyr Pro Thr
355 360 365

Thr Glu Asn Gly Phe Ser Leu Thr Pro Asn Val Thr His Ala Arg Ser 370 375 380

Arg Gly Thr Val Arg Leu Arg Ser Arg Asp Phe Arg Asp Lys Pro Ala
385 390 395 400

Val Asp Pro Arg Tyr Phe Thr Asp Pro Glu Gly His Asp Met Arg Val
405 410 415

Met Val Ala Gly Ile Arg Lys Ala Arg Glu Ile Ala Ala Gln Pro Ala
420 425 430

Met Ala Glu Trp Thr Gly Arg Glu Leu Ser Pro Gly Thr Glu Ala Gln
435 440 445

Thr Asp Glu Glu Leu Gln Asp Tyr Ile Arg Lys Thr His Asn Thr Val
450 455 460

Tyr His Pro Val Gly Thr Val Arg Met Gly Pro Ala Asp Asp Met
465 470 475 480

Ser Pro Leu Asp Pro Glu Leu Arg Val Lys Gly Val Thr Gly Leu Arg
485 490 495

Val Ala Asp Ala Ser Val Met Pro Glu His Val Thr Val Asn Pro Asn
500 505 510

Ile Thr Val Met Met Ile Gly Glu Arg Cys Ala Asp Leu Ile Arg Ala
515 520 525

Ser Arg Thr Gly Glu Thr Thr Ala Glu Ala Glu Leu Ser Ala Ser
530 535 540

Leu Ala

545

<210> 4

<211> 1641

<212> DNA

<213> Arthrobacter pascens

<400> 4

atgcacatcg acaacgtcga aaacctcaac gaccgcgagt tcgactacat catcatcggc 60 ggcggttccg ccggagcgc agtcgccgc cgcctgagcg aggagcccac cgtgtccgtg 120 gcgctggtgg aggccgcc ggacgaccgc ggcgttcccg aggtactgca gctcgaccgc 180 tggatggagc tgctggaatc cggctacgac tgggactacc cgatcgaacc gcaggagaac 240 ggcaactcct tcatgcgcca cgcccgcgcg aagatcatgg gtggctgctc cagccacaac 300 tcctgcatcg ccttctgggc cccgcgcgaa gacctggacg agtgggagtc caagtacggc 360 gccaccggct ggaacgctga gtccgcctgg ccgctgtacc agcggctgga gaccaacgag 420

gacgccggcc	cggacgcgcc	gcaccacggc	gactcaggcc	cggtgcacct	gatgaacgtg	480
ccccggcgg	accccgccgg	cgtcgcactc	ctggacgcct	gcgaacaggc	aggcattccg	540
cgcgcgaagt	tcaacaccgg	caccaccgtg	atcaatggcg	ccaacttttt	ccagatcaca	600
cgccgcgcgg	acggcacccg	ttcctccagc	teggteteet	acatccaccc	gatcatcgag	660
cgcgggaact	tcaccctgct	gaccgggttg	cgcgcccggc	aactggtgtt	cgacgcggac	720
aagcgctgca	ccggcgtcga	cgttgtggac	tcggcgttcg	gccggactca	ccggctctcc	780
gcgcgttgcg	aggtcatcct	gtccaccggc	gccattgact	cgcctaagct	gctcatgctc	840
teeggeateg	gccccgccgc	gcacctcgcc	gagcacggcg	tcgaggtcct	ggtcgactcc	900
cccggtgtcg	gcgagcacct	gcaggaccac	cccgaaggcg	tcgtccagtt	cgaggccaag	960
cagcagatgg	tgcagacttc	gacgcagtgg	tgggagatcg	gcatcttcac	ccccaccgag	1020
aacggcctgg	accgcccgga	cctgatgatg	cactacggct	ccgtcccgtt	cgacatgaac	1080
accctgcggt	acggctaccc	caccacggag	aacggcttca	gcctcacgcc	gaacgtcacg	1140
cacgcccgct	cccgcggcac	cgtccggctg	cgcagccgcg	acttccgcga	caageccgcc	1200
gtcgacccgc	ggtacttcac	tgatccggag	ggccacgaca	tgcgcgtcat	ggtggccggc	1260
atccgcaagg	cccgtgaaat	cgccgcccag	cctgccatgg	ccgaatggac	cggccgcgag	1320
ctctcgcccg	gcaccgaggc	gcagaccgac	gaggaactgc	aggactacat	ccgcaagacg	1380
cacaacaccg	tttaccaccc	cgtcggcacc	gtccgcatgg	gaccagccga	cgacgacatg	1440
tegeegeteg	accccgagct	gcgggtgaag	ggcgtgaccg	gcctgcgcgt	cgccgatgcc	1500
tctgtcatgc	ctgaacacgt	cacggtcaat	cccaacatca	ccgtcatgat	gatcggcgaa	1560
cgctgcgccg	acctcatccg	cgccagccgg	accggcgaaa	caacgacggc	ggaggcggag	1620
ctcagcgcgt	ccctcgcctg	a				1641

<210> 5

<211> 1494

<212> DNA

<213> Mesembryanthemum crystallinum

<400> 5

aaaaaaaaaa ttttacttct ctgttttacc aaaaagagaa aaaaaaatga ctacttacac 60 caatggcaac tacacacaac caaaaaccct agacaaagat gaacaattag ctggtttggc 120 agtgacatta gcaaatgcag ctgcttttcc aatgatcctg aaatcagcct ttgagctaaa 180 aatcettgae atatteteaa aageagggga aggegtgttt gtategaett etgagatege 240 tagccaaatc ggggcaaaga accctaatgc cccggtgttg ttggaccgga tgctccggct 300 cctggctagc cactctgtgt taacatgcaa gctccaaaag ggtgagggtg gttctcaaag 360 ggtgtatggt ccagctcccc tttgcaacta tcttgctagt aatgatggtc aaggctctct 420 tggccctttg cttgttttgc atcatgacaa ggtcatgatg gagagttggt ttcacttgaa 480 tgattacata ctagaaggag gtgttccatt caagcgcgct catgggatga tccaattcga 540 tatcctggtc atgaagaagc tccttgacaa ctacaatggg tttaatgatg tcaaggtcct 660 agttgatgtg ggtggtaaca ttggtgtcaa tgtgagcatg atcgtcgcta agcatactca 720 cattaagggc atcaactatg acttgcctca tgtcattgct gatgctcctt cttaccccgg 780 tgtggagcat gttggtggta acatgtttga gagcatacca caagcagatg ccattttcat 840 gaagtgggtg ttgcatgatt ggagcgacga gcattgcgtg aagatactca acaagtgcta 900 tgagagcctg gcaaagggag ggaagatcat ccttgtggaa tcgcttatac cagtaatccc 960 agaagacaac ctcgaatcac acatggtgtt tagccttgat tgccacactt tggtgcacaa 1020 ccaaggtgga aaagagagat caaaggagga ttttgaagcc ttagcttcca agactggctt 1080 ctctacagtt gatgtcattt gctgtgccta tgacacttgg gtcatggagc tctacaagaa 1140 gtgattcaag ctctaaatgc tgtgttgttg tcattgttgc tagcccaagt agctagctag 1200 ctggttaaaa tttctcctac ctagcatttg ttttatggct aagttgagga gattcatgta 1260 ttgtaaatgt tgtgtttggg tttgggtttg tatttgtatt tgtgttttgt tgttgtgtct 1320 ttgtagctaa gttgatatcc tgctcatcta ggctggctgc attttttttg tggctgcctg 1380 acaatgtagc atttgtggtt ttctttcaat aaagcatcta ttgtacctct gttatcagtg 1440

1494

37

tatgatttgc ctttattttt aataacttaa ttttttttt cttgtttata tcca

<210> 6 <211> 38 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Primer <400> 6 tttttggatc catgactact tacacaatgg caactaca 38 <210> 7 <211> 37 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Primer <400> 7

tttttttgc ggccgcataa aggcaaatca tacactg